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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,182	11/02/2005	Michael Kaus	DE 020180	9223

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EXAMINER	
ABDELNOUR, AHMED F	
ART UNIT	**PAPER NUMBER**
2624	
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10/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/521,182	KAUS ET AL.	
	Examiner	Art Unit	
	Farras Abdelnour	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 14 January 2005 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date March 20, 2007.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 020160602, EPO, filed on July 19, 2002.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

3. Claim 8 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 8 defines a computer program embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed computer program can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5 and 7-8 rejected under 35 U.S.C. 102(b) as being anticipated by Liao *et al.* (C.-W. Liao and G. Medioni, Simultaneous Surface Approximation and

Segmentation of Complex Objects, Computer Vision and Image Understanding, Volume 73, Issue 1, 1 January 1999, Pages 43-63.).

Regarding Claim 1, Liao *et al.* discloses a method for the simultaneous segmentation of multiple or composed objects in an image, wherein a deformable surface model is to be adapted to a first surface of a first object and a second surface of a second object and wherein the deformable surface model comprises a first partial deformable surface model and a second partial deformable surface model ("Here, we propose an approach which segments multiple objects (2-D or 3-D) of arbitrary topologies, and gives each segmented object G^1 analytical representation," page 44, section 1. Also see "This system breaks an object into components automatically, and any pair of adjacent components is connected by a connecting Bezier surface," page 44, section 2.3.2), comprising the steps of:

(a) applying the first partial deformable surface model describing a structure of the first surface of the first object ("The formalism we are about to establish amounts to deforming an initial surface to conform as closely as possible to the input 3-D data points. This is achieved by defining an attraction force field around the data points to bring the initial surface closer to them. The initial surface is updated by a function minimization algorithm, Powell [5–10]," page 48, section 4.3);

(b) applying the second partial deformable surface model describing a structure of the second surface of the second object ("This is achieved by defining an attraction force field around the data points to bring the initial surface closer to them. The initial surface is updated by a function minimization algorithm, Powell [5–10]," page 48,

section 4.3), wherein the first partial deformable surface model and the second partial deformable surface model have a prescribed spatial relationship corresponding to a spatial relationship of the first object and the second object (See Fig. 3a and Fig. 3b relating first and second objects); and

(c) adapting the first partial deformable model to the first surface and the second partial deformable model to the second surface, wherein the prescribed spatial relationship of the first partial deformable surface model and the second partial deformable surface model is used for the adaptation (consult Fig. 3 where 3D surface refinement is depicted. B-spline is used to identify two elements of the surface with prescribed relationship (the elements define the shape of the object). The elements are then connected via Beizer connection).

Regarding Claim 2, Liao *et al.* discloses a method according to claim 1, wherein the spatial relationship of the first partial deformable surface model and the second partial deformable surface model is prescribed by means of an additional edge (Consult Fig. 12), which connects a first vertex of the first partial deformable surface model with a second vertex of the second partial deformable surface model ("A connecting surface serves as the joint between two connected simpler elements. It is defined by a 3-D Bezier blending surface as depicted in Fig. 12. First, we initialize two closed B-splines curves (B-snakes [3]) moving on the B-spline surfaces of the primitives. To be more specific, these two B-snakes are, in fact, tuned on the (u, v) parameter spaces of the B-spline surfaces to fit the connecting surface to the data points in 3-D space. Let C_1 and

C_2 be the boundary curves of the connecting surface on the two objects. We sample N points from C_1 and C_2, and N should be large enough for both C_1 and C_2.").

Regarding Claim 3, Liao *et al.* discloses a method according to claim 2, wherein the additional edge is a featureless vertex connection (In Fig. 12, the connecting surface consists of lines which can be viewed as degenerate triangles).

Regarding Claim 4, Liao *et al.* discloses a method according to claim 1, wherein the first and second partial deformable surface models each comprise a mesh with a plurality of surface elements, further comprising the steps of:

detecting feature points for the surface elements at the first and second surfaces of the first and second objects ("Each object detected is the result of Boolean operations on its components. The elements of the object extracted first are disconnected and represented by closed B-spline surfaces," page 61, column 1); and

recalculating coordinates.of the surface elements of the mesh to represent the feature points ("A deformable scheme, based on Bezier blending surfaces, is used to connect the elements smoothly, and a smooth surface representation for complex objects can be obtained. The system proceeds automatically without human interaction," page 61, column 1).

Regarding Claim 5, Liao *et al.* discloses a method according to claim 4, wherein the recalculation step comprises the steps of:

minimizing a distance between the feature points and the surface elements ("E_{ext} expresses the distance between the fitting surface and the
data points," page 49, column 1); and

minimizing an internal energy of the first and second partial deformable surface models ("E_{int} depends on the constraints, such as smoothness," page 49, column 1).

Regarding Claims 7 and 8, consult Section 5, "Experimental Results" ("The platform is a Sparc-10 workstation," page 54, column 1). Workstations compile and run computer programs.

Claim Rejections - 35 USC § 103

6. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Liao *et al.* as applied to claim 1 above, and further in view of Weese *et al.* (Shape Constrained Deformable Models for 3D Medical Image Segmentation, Lecture Notes in Computer Science, Volume 2082/2001, Information Processing in Medical Imaging: 17th International Conference, IPMI 2001, Davis, CA, USA, June 18-22, 2001, Proceedings, J. Weese, M. Kaus, C. Lorenz, S. Lobregt, R. Truyen, and V. Pekar).

Regarding Claim 6, Liao *et al.* discloses image segmentation method as described in Claims 1-5. Liao *et al.* does not explicitly describe expressions for internal energy comprising an extended internal energy.

Weese *et al.* teaches a method according to claim 5, wherein the internal energy comprises an extended internal energy relating to a difference of a length of the

additional edge and a distance between the first and second partial deformable models ("For that purpose the difference vectors between the coordinates of two neighboring mesh vertices are considered. Difference vectors for the deformable model and the shape model are compared, and the deviations between both are penalized," page 383, section 2.3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Weese's internal energy constraint to Liao's image segmentation for the purpose of robust means of segmenting the image.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farras Abdelnour whose telephone number is 571-270-1806. The examiner can normally be reached on Mon. - Thurs. 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Farras Abdelnour
Examiner
Art Unit 2624

FA

WENPENG CHEN
PRIMARY EXAMINER

10/16/07